



Pacific  
Community  
Communauté  
du Pacifique

# Case study – Regional fisheries data integration

Tuna Fisheries Data Management  
System  
(TUFMAN2)

## Data Management main principles

- Data accuracy / validity / reliability
- Data consistency / integrity
- Data security
- Data stewardship
- Data accessibility

### Development of tools

- for SPC
- for Member countries

# A bit of history...

# At the beginning of time...

- Member Countries collecting paper data forms from fishing vessels
- Shipped to SPC for entry
- Double entry of data exclusively at SPC
- Data sent back to country once entered, through the CES software



# Catch and Effort Query System v1.0

- Visual queries on Logbook data set
- Data exploration tool
- Maps



## Member Countries can

- query & analyse their own data
- build reports

Catch Reporting Options - Longline logsheet data

Species

<input type="checkbox"/> Albacore (ALB)	<input type="checkbox"/> Black marlin (BLM)	<input type="checkbox"/> Blue shark (BSH)	<input type="checkbox"/> Other (OTH)
<input type="checkbox"/> Bigeye (BET)	<input type="checkbox"/> Blue marlin (BUM)	<input type="checkbox"/> Mako sharks (MAK)	
<input type="checkbox"/> Pacific Bluefin (PBF)	<input type="checkbox"/> Striped marlin (MLS)	<input type="checkbox"/> Oceanic whitetip shark (OCS)	
<input type="checkbox"/> Skipjack (SKJ)	<input type="checkbox"/> Indo-Pacific sailfin (SFA)	<input type="checkbox"/> Silky Shark (FAL)	
<input type="checkbox"/> Southern bluefin (SBF)	<input type="checkbox"/> Short-billed spearfish (SSP)	<input type="checkbox"/> Thresher sharks (THR)	
<input type="checkbox"/> Yellowfin (YFT)	<input type="checkbox"/> Broadbill swordfish (SWD)	<input type="checkbox"/> Shark - Other (SHK)	

**Aggregates**

All tuna combined

All billfish combined

Total of all selected species

Total of non-selected species

Total of all species

**Catch**

Kilograms

Metric tonnes

Number of fish

Metric tonnes

**Effort**

Days fishing

Hundreds of hooks

Number of sets

Number of trips

Number of vessels

**Catch per Unit Effort**

Kilograms per 100 hooks

Metric tonnes per day

Number of fish per day

Number per 100 hooks

Guam

Indonesia

Japan

Kiribati

Korea

Marshall Islands

New Caledonia

New Zealand

Niue

Palau

Papua New Guinea

Philippines

Samoa (Western)

Solomon Islands

Spain

Taiwan

Tonga

Tuvalu

United States

Vanuatu

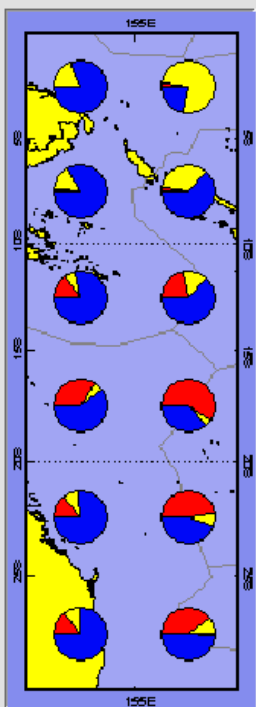
Vietnam

Output

Query Output - Press ESC to return to previous screen...

Yy	Long	Latd	Alb_mt	Bet_mt	Skj_mt	Yft_mt	Tun_mt
2020	2.50	2.50	0.000	0.000	0.000	0.000	0.000
2020	127.50	7.50	0.000	0.470	0.000	0.030	0.500
2020	127.50	12.50	2.250	11.380	0.000	1.170	14.800
2020	127.50	17.50	58.480	29.290	0.000	7.720	95.490
2020	132.50	7.50	2.930	649.150	0.000	133.030	785.110
2020	132.50	12.50	253.460	373.230	0.141	81.420	708.251
2020	132.50	17.50	82.910	27.250	0.153	13.780	124.093
2020	137.50	7.50	0.000	0.290	0.000	0.050	0.340
2020	137.50	12.50	38.500	36.220	0.006	22.640	97.366
2020	137.50	17.50	59.770	14.440	0.000	7.710	81.920
2020	142.50	-22.50	0.010	0.209	0.000	0.968	1.187
2020	142.50	-17.50	0.242	0.193	0.000	1.705	2.140
2020	142.50	-12.50	1.170	0.087	0.000	0.342	1.599
2020	142.50	2.50	0.000	7.470	0.000	0.810	8.280
2020	142.50	7.50	0.120	82.360	0.000	22.290	104.770
2020	142.50	12.50	0.240	8.280	0.000	4.240	12.760
2020	142.50	17.50	29.871	4.380	0.000	6.151	40.402
2020	142.50	22.50	0.180	0.000	0.000	0.000	0.180
2020	142.50	27.50	0.150	0.000	0.000	0.000	0.150
2020	142.50	32.50	15.928	10.255	0.147	131.604	157.934
2020	142.50	37.50	22.811	0.443	0.000	171.760	344.353
2020	142.50	42.50	3.055	0.119	0.000	33.208	39.262

Mapping module v6.0 - One map per occ...



1 - Boundaries

M...

LAT/L...

GRID

EEZ

COAST LINES

Add more Mapinfo

3 - Graphic Type

CIRCLES

PIES

SQUARES

4 - Main Options

Color Palette

Pies : Divide by

5 - Ma...

Select Field

BE

SKJ

YFT

TUN

Map all Years

Map for Year =

# Catch and Effort Query System v1.0

...ata and Gear Type(s)

Select type and source of data

Operational (Logsheet) catch/effort data - UNRAISED

Aggregate catch/effort data - as provided by the DWFNs - UNRAISED

Aggregate catch/effort data - RAISED

Aggregate Public Domain catch/effort data - RAISED

Annual Catch Estimates for the WCPFC CA, and other OCEAN areas

Annual Catch Estimates for the WCPFC CA, by EEZ

Monthly Catch/Effort Estimates for the WCPFC CA by EEZ, Set type

MODEL catch and effort database (OFF only)

VMS Days at Sea

Output  by source of data

Select Gear(s)

Longline (L)  Trawl (T)

Pole and Line (P)

Purse Seine (S)



At the  
beginning...



# The advent of TUFMAN...

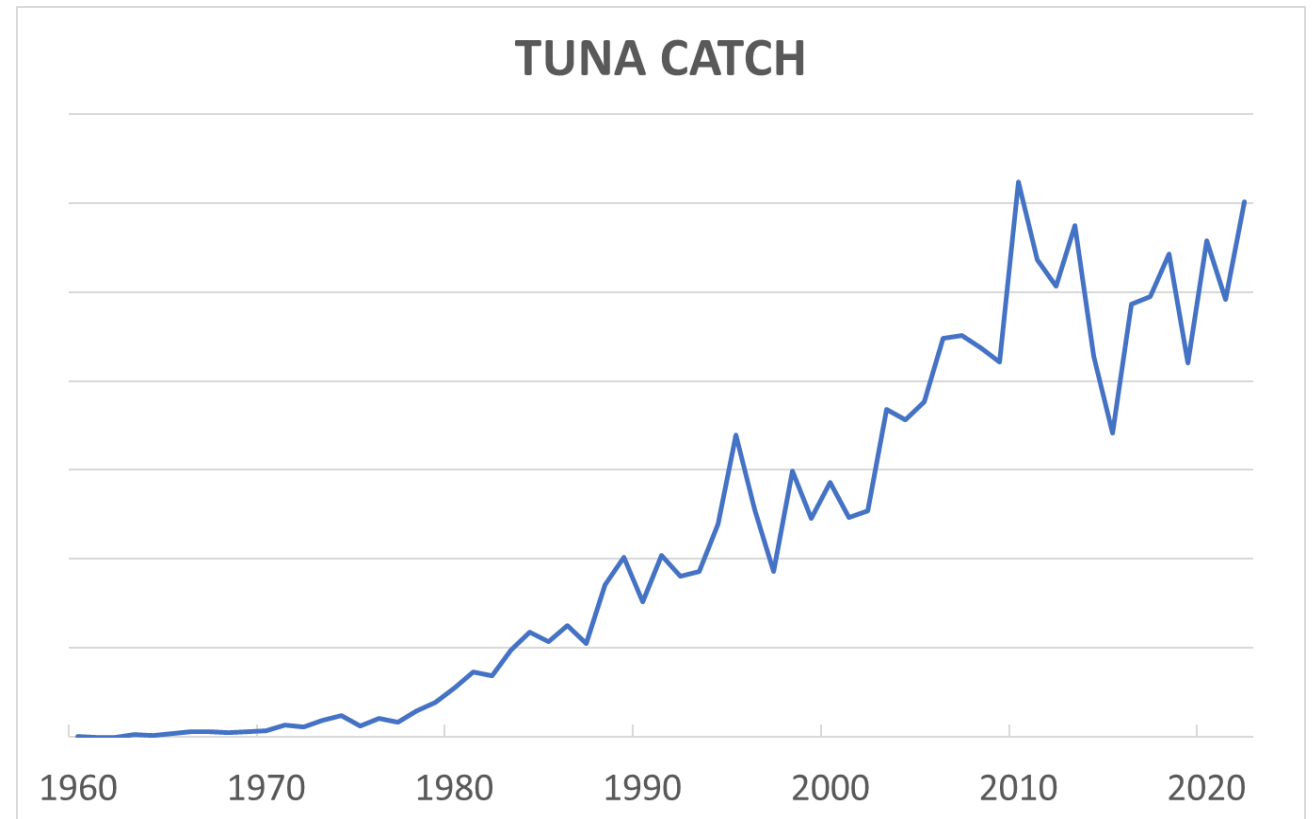


# Country Needs



- Increasing fishing activity in PICTs EEZs
- Countries needing more real-time data
- Fishing vessel licensing

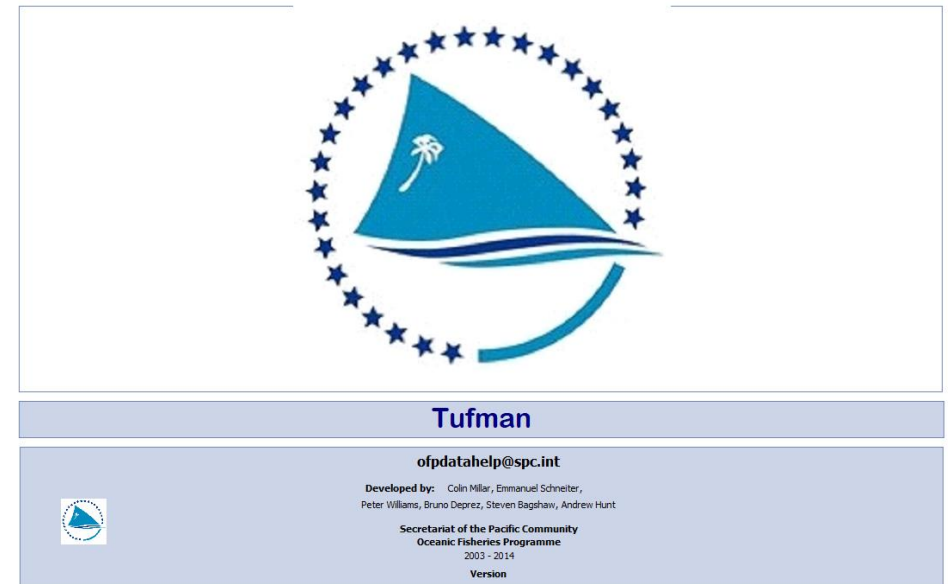
Need for new tools



# TUFMAN



- MsAccess local database (initially)
- In country data management
- Licensing module
- Various data sources
- Data still entered at SPC (duplication)



# TUFMAN




**Tufman**

ofpdatahelp@spc.int

Developed by: Colin Milar, Emmanuel Schreier, Peter Williams, Bruno Deprez, Steven Bagshaw, Andrew Hunt

Secretariat of the Pacific Community  
Oceania Fisheries Programme  
2003 - 2014

Version



**MAIN MENU**

- Main
- TUFMAN Health
- Licensing
- National Fleet
- Data Registry
- Logsheet
- Vessel Activity Log
- Observers
- Port Sampling
- Unloadings
- Packing Lists
- Reporting
- VDS Management
- Vessel Data Lookup
- Exit Tufman**

### Maps generator

- 1 Map of Catch and Effort (Source : Logbooks)
- 2 Vessel Trip - Daily cruise track
- 3 Vessel Trip Track - VMS Data
- 4 Telex Positions

**Gear**

Purse seine

**Time**

Year: 2017

Aggregate by: Year

**Date Range**

1/01/2010 - 31/12/2010

**Map Fields**

Effort (hooks)

Catch in number

Catch in weight (metric tons)

**Species** [ALL] [NONE]

- Albacore
- Yellowfin
- Bigeye
- Skipjack
- Striped Marlin
- Blue Marlin
- Black Marlin
- Swordfish
- Mahi mahi
- Wahoo
- Non selected species

**Legend**

Title: Species catch

Legend Max value: 0

Legend embedded to the map

**Nationality of Catch**

National Fleet

(Licensed vessels only)

Company Nationality

Flag of registration

**Area**

Aggregate by: 5°x5° squares

**Vessel / Trip**

Vessel Name

Trip Date

**Produce Map**

### WCPFC Reporting Module

#### Annual Report - Part I

**Flag-state Reporting**

- Table 1.** Annual catch and effort estimates for the National fleet, by gear, in the WCPFC Convention Area (past five years)
- Table 2.** Number of National fleet vessels, by gear and size category, active in the WCPFC Convention Area
- Figure 1** Historical annual catch for the National fleet, by gear and primary species, for the WCPFC Convention Area
- Figure 2** Historical annual vessel numbers for the [National fleet], by gear for the WCPFC Convention Area
- Figure 3.** Annual distribution of target species catch and effort by the National fleet active in the WCPFC Convention Area

**Coastal-state Reporting**

- Number of licensed vessels by year and fleet for activities in the National EEZ (past five years)
- Annual catch and effort estimates by fleet for activities in the National EEZ (past five years)
- Annual distribution of target species catch and effort (all fleets) in the National EEZ

**Gear**

Longline

**Latest Year**

2023

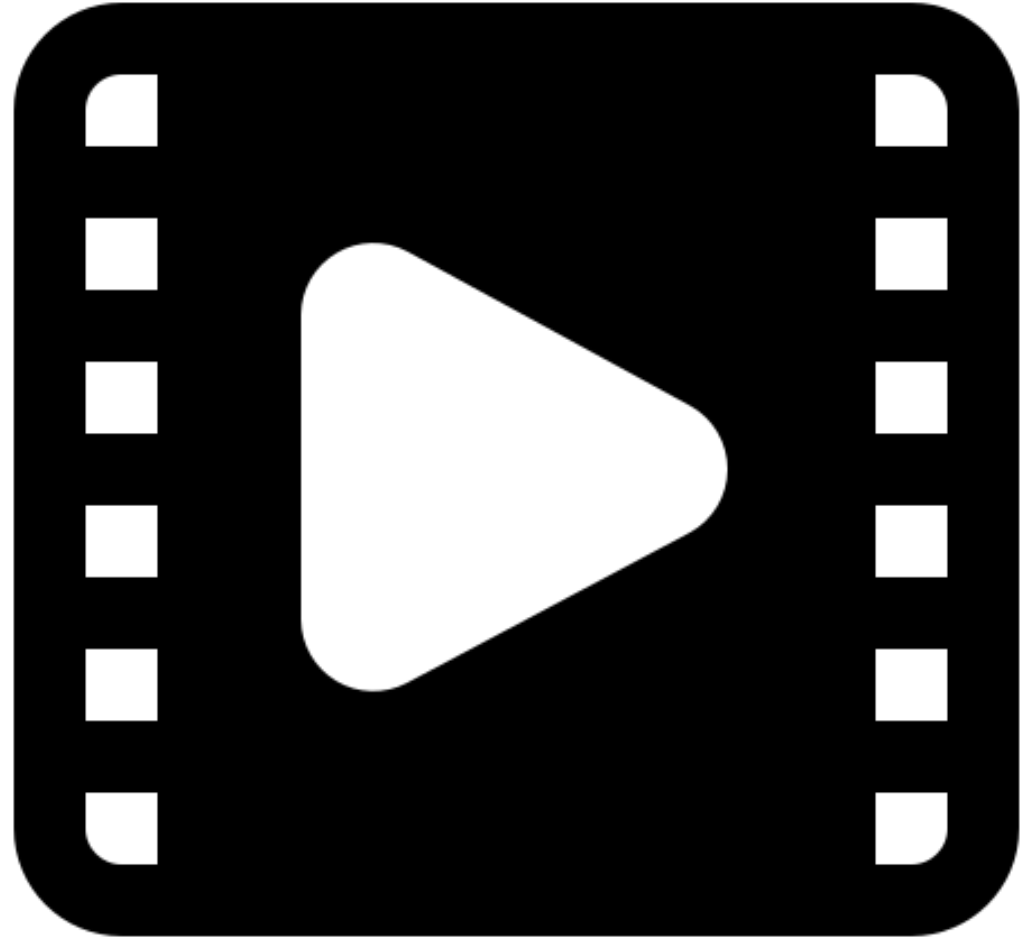
**MAP - Effort or Catch**

Effort  Catch (weight)

**Produce Table/Figure**



TUFMAN



And then came TUFMAN2

2020

# What is TUFMAN2?

- One-stop-shop database for all oceanic fisheries data
- Logsheets, unloadings, port sampling, observer, VMS, cannery, E-Monitoring, Tagging and other data are integrated
- Purse seine, longline, pole and line, deep-water snapper, etc
- Built for scientific purposes but utilised for other things
- Data entry tool, data checking and data dissemination tool
- In use in most Pacific countries

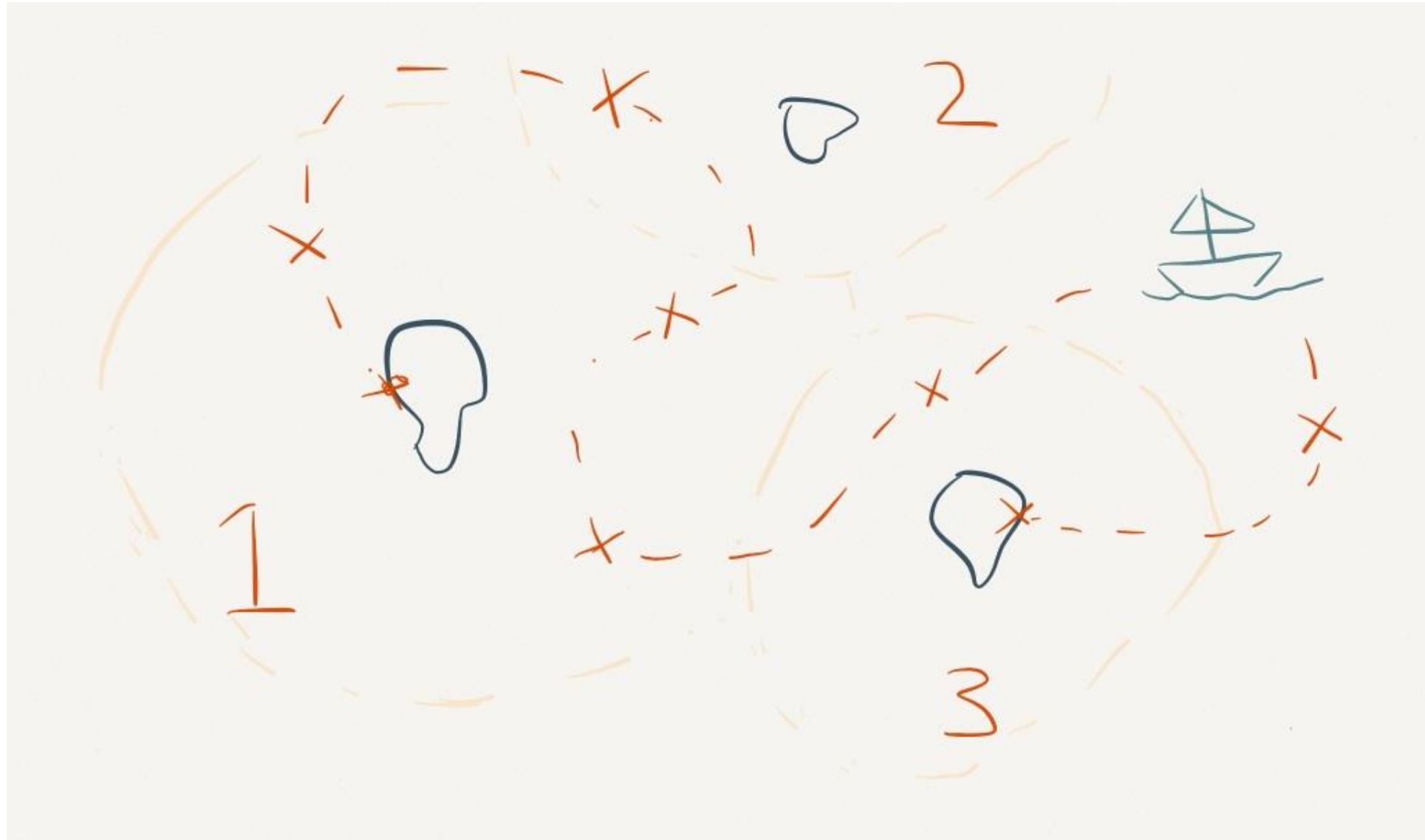
TUFMAN 2														43		+ Create new logsheet
Logline logsheets / List																
Links	Vessel name	Flag	Departure d...	Return date	Departure port	Return port	System src	Country src	Last edited	Last edit by						
			2024													
	CHONG MYONG 2003	TO	16 Apr 2024	18 Apr 2024	NUKUALOFU	NUKUALOFU	OnBoard Android 3	TO	19 Apr 2024 14:14	fvchongmyong709@gmail.com						
	PACIFIC BREEZE	TO	10 Apr 2024	16 Apr 2024	NUKUALOFU	NUKUALOFU	OnBoard Android 3	TO	16 Apr 2024 21:35	onboardpacificbreeze@gmail.com						
	PACIFIC SUNRISE	TO	10 Apr 2024	16 Apr 2024	NUKUALOFU	NUKUALOFU	OnBoard Android 3	TO	17 Apr 2024 13:47	soanafinau2601@gmail.com						
	PACIFIC DAWN	TO	10 Apr 2024		NUKUALOFU	NUKUALOFU	Tufman2	TO	17 Apr 2024 07:13	ednalenititafakahau@gmail.com						
	PACIFIC BREEZE	TO	03 Apr 2024	09 Apr 2024	NUKUALOFU	NUKUALOFU	OnBoard Android 3	TO	09 Apr 2024 21:35	onboardpacificbreeze@gmail.com						
	PACIFIC DAWN	TO	03 Apr 2024	09 Apr 2024	NUKUALOFU	NUKUALOFU	OnBoard Android 3	TO	18 Apr 2024 07:20	ednalenititafakahau@gmail.com						
	PACIFIC SUNRISE	TO	03 Apr 2024	09 Apr 2024	NUKUALOFU	NUKUALOFU	OnBoard Android 3	TO	16 Apr 2024 18:07	onboardsunrise@gmail.com						
	PACIFIC SUNRISE	TO	30 Mar 2024	03 Apr 2024	NUKUALOFU	NUKUALOFU	OnBoard Android 3	TO	03 Apr 2024 21:35	onboardsunrise@gmail.com						
	PACIFIC DAWN	TO	26 Mar 2024	02 Apr 2024	NUKUALOFU	NUKUALOFU	OnBoard Android 3	TO	09 Apr 2024 18:07	nia.vaipuna@gmail.com						
	PACIFIC DAWN	TO	18 Mar 2024	25 Mar 2024	NUKUALOFU	NUKUALOFU	OnBoard Android 3	TO	09 Apr 2024 18:07	pacificdawn.to@gmail.com						
	SHUNJIE	TW	08 Mar 2024	15 Apr 2024	NUKUALOFU	NUKUALOFU	OnBoard Android 3	TO	17 Apr 2024 21:35	onboardvesselshunjie@gmail.com						
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	PACIFIC SUNRISE	TO	06 Mar 2024	12 Mar 2024	NUKUALOFU	NUKUALOFU	OnBoard Android 3	TO	13 Mar 2024 08:32	onboardsunrise@gmail.com						
	PACIFIC DAWN	TO	06 Mar 2024	11 Mar 2024	NUKUALOFU	NUKUALOFU	OnBoard Android 3	TO	09 Apr 2024 18:07	nia.vaipuna@gmail.com						
	USUKALONG 2	FJ	01 Mar 2024	06 Apr 2024	NUKUALOFU	NUKUALOFU	Tufman2	TO	16 Apr 2024 18:07	fta.ika1516@gmail.com						
	PACIFIC SUNRISE	TO	27 Feb 2024	05 Mar 2024	NUKUALOFU	NUKUALOFU	OnBoard Android 3	TO	12 Mar 2024 18:06	nia.vaipuna@gmail.com						
	PACIFIC BREEZE	TO	27 Feb 2024	05 Mar 2024	NUKUALOFU	NUKUALOFU	OnBoard Android 3	TO	08 Mar 2024 18:06	nia.vaipuna@gmail.com						
	PACIFIC DAWN	TO	27 Feb 2024	05 Mar 2024	NUKUALOFU	NUKUALOFU	OnBoard Android 3	TO	12 Mar 2024 18:06	nia.vaipuna@gmail.com						
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	PACIFIC BREEZE	TO	19 Feb 2024	22 Feb 2024	NUKUALOFU	NUKUALOFU	OnBoard Android 3	TO	18 Mar 2024 08:51	nia.vaipuna@gmail.com						
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	PACIFIC DAWN	TO	19 Feb 2024	26 Feb 2024	NUKUALOFU	NUKUALOFU	OnBoard Android 3	TO	28 Feb 2024 07:08	nia.vaipuna@gmail.com						
	RITUNA 2	FJ	16 Feb 2024	05 Apr 2024	NUKUALOFU	NUKUALOFU	OnBoard Android 3	TO	17 Apr 2024 08:51	ednalenititafakahau@gmail.com						
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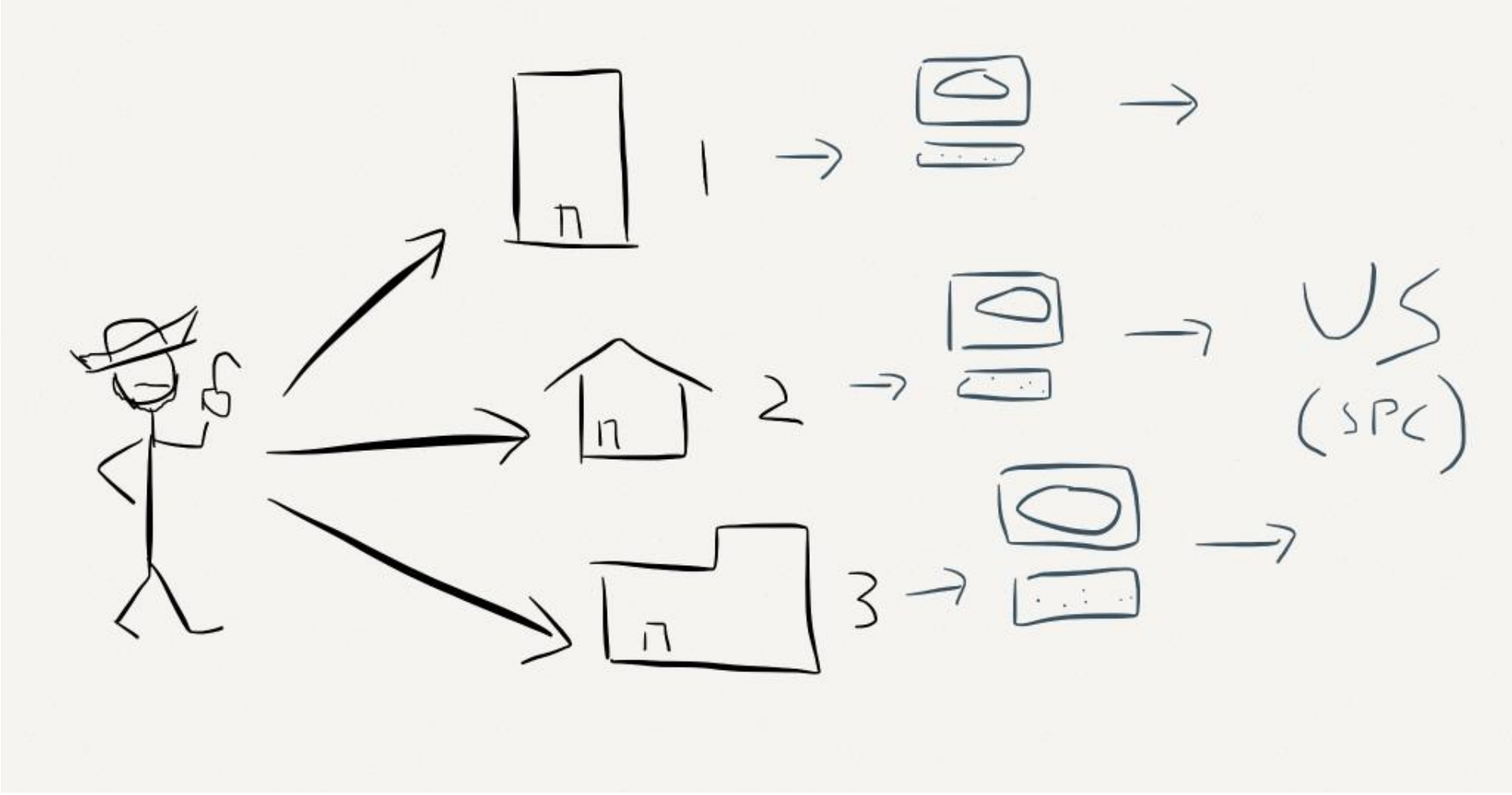
# Increased regional collaboration

- One database, multiple countries
- Share with and receive data from other countries automatically according to rules
- Reduces data entry time
- Reduces time between the trip and data availability
- Allows receipt of regional data entry by FFA, WCPFC, SPC

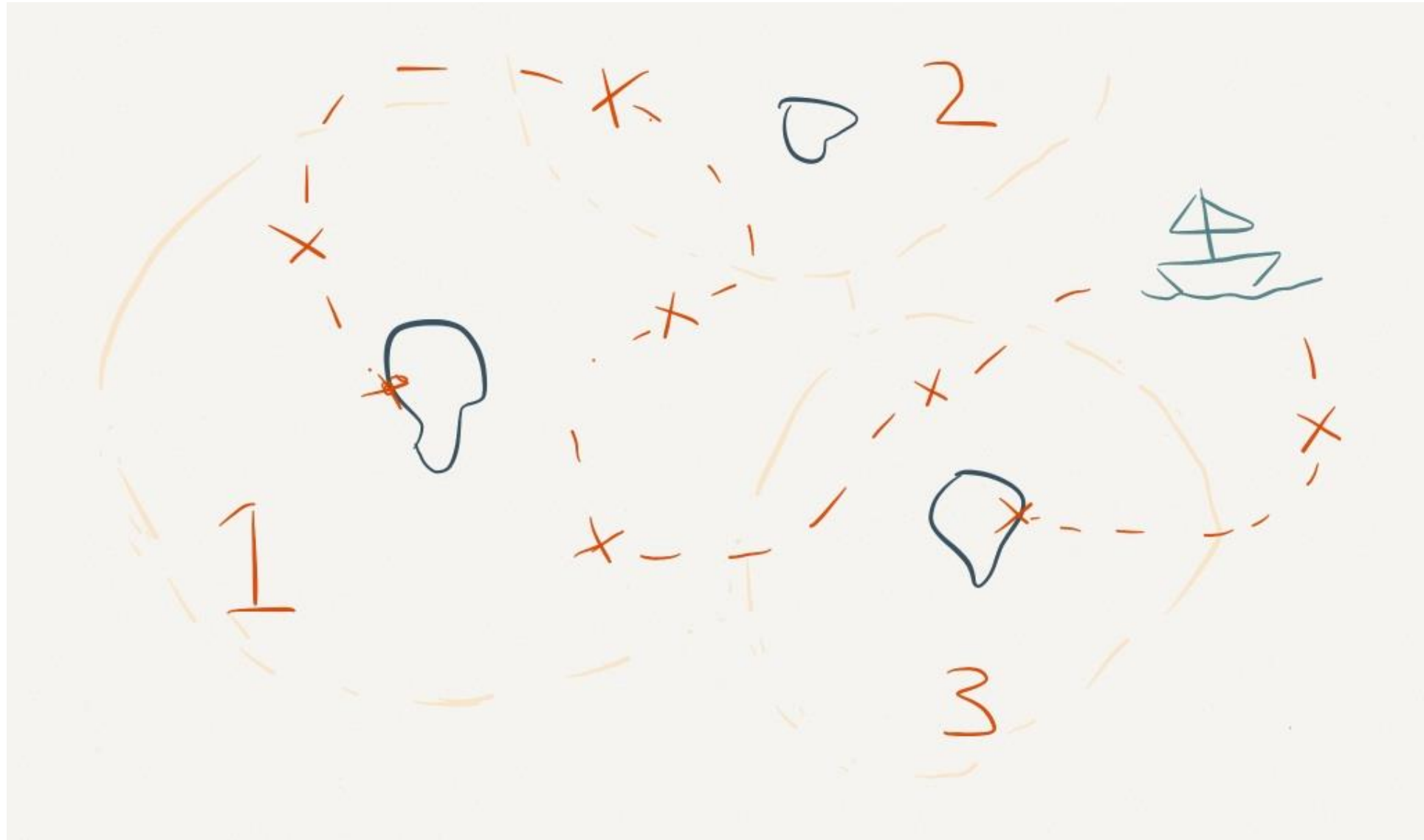


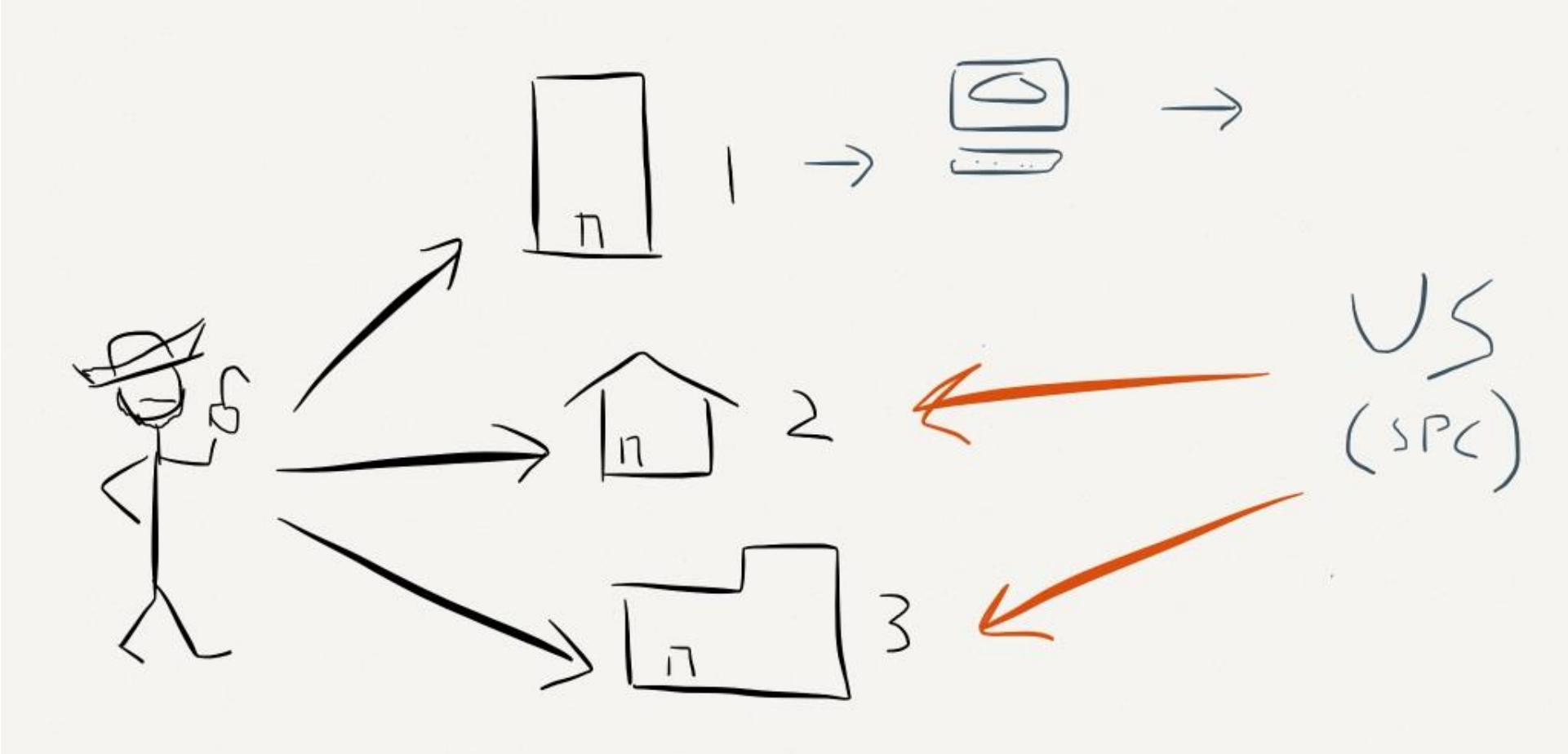
# How it used to work...








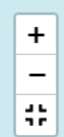
# How it works now.





# Increased data quality assessment

- Every form sent to TUFMAN2 go through data quality checks
  - 600 different tests including
    - Species ranges
    - Position checks
    - Observer codes
  - Each submission is flagged   
- Every form is linked with other data sources for comparison and raising



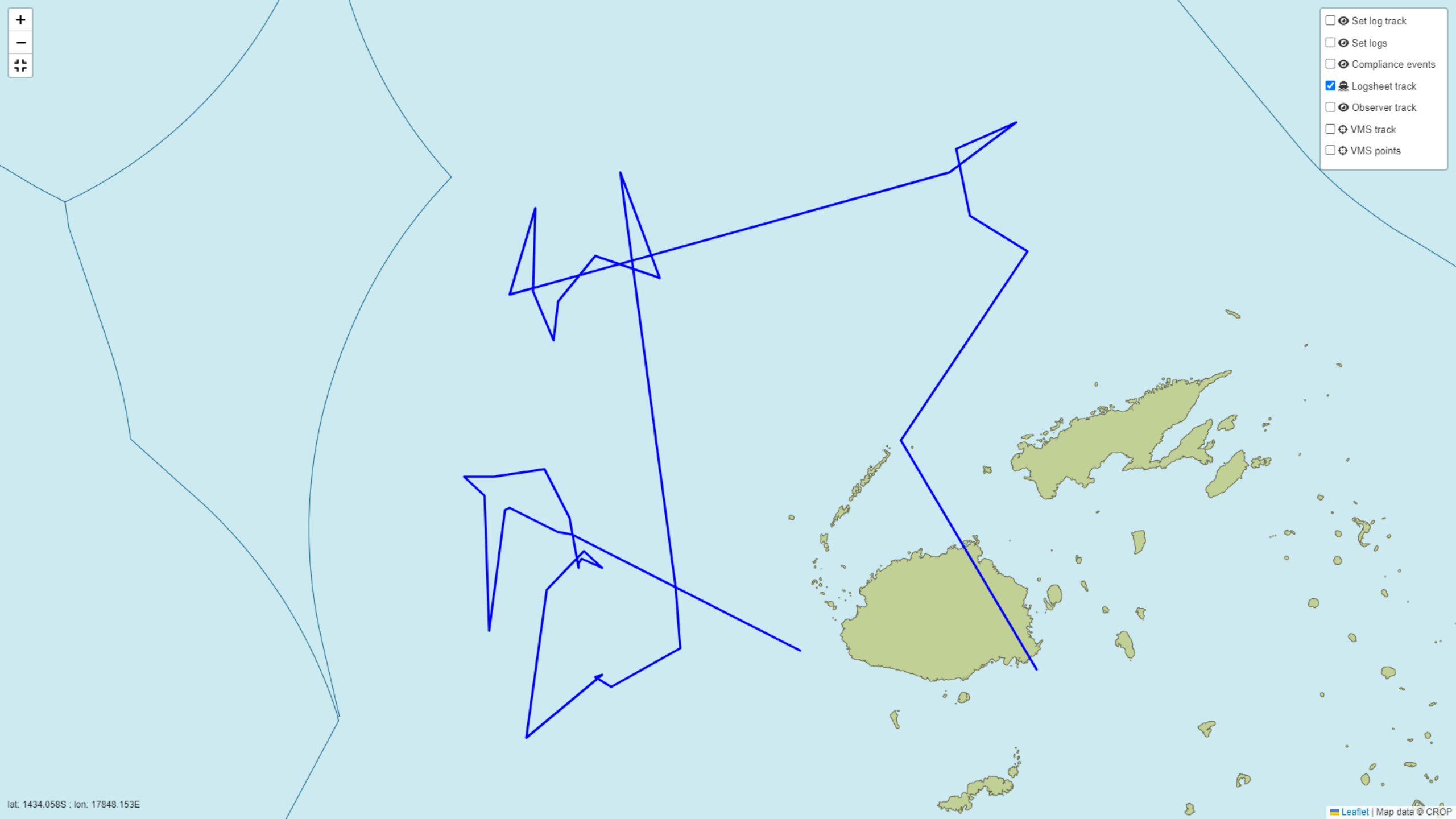
- Set log track
- Set logs
- Compliance events
- Logsheet track
- Observer track
- VMS track
- VMS points

lat: 1438.523S : lon: 17952.753E





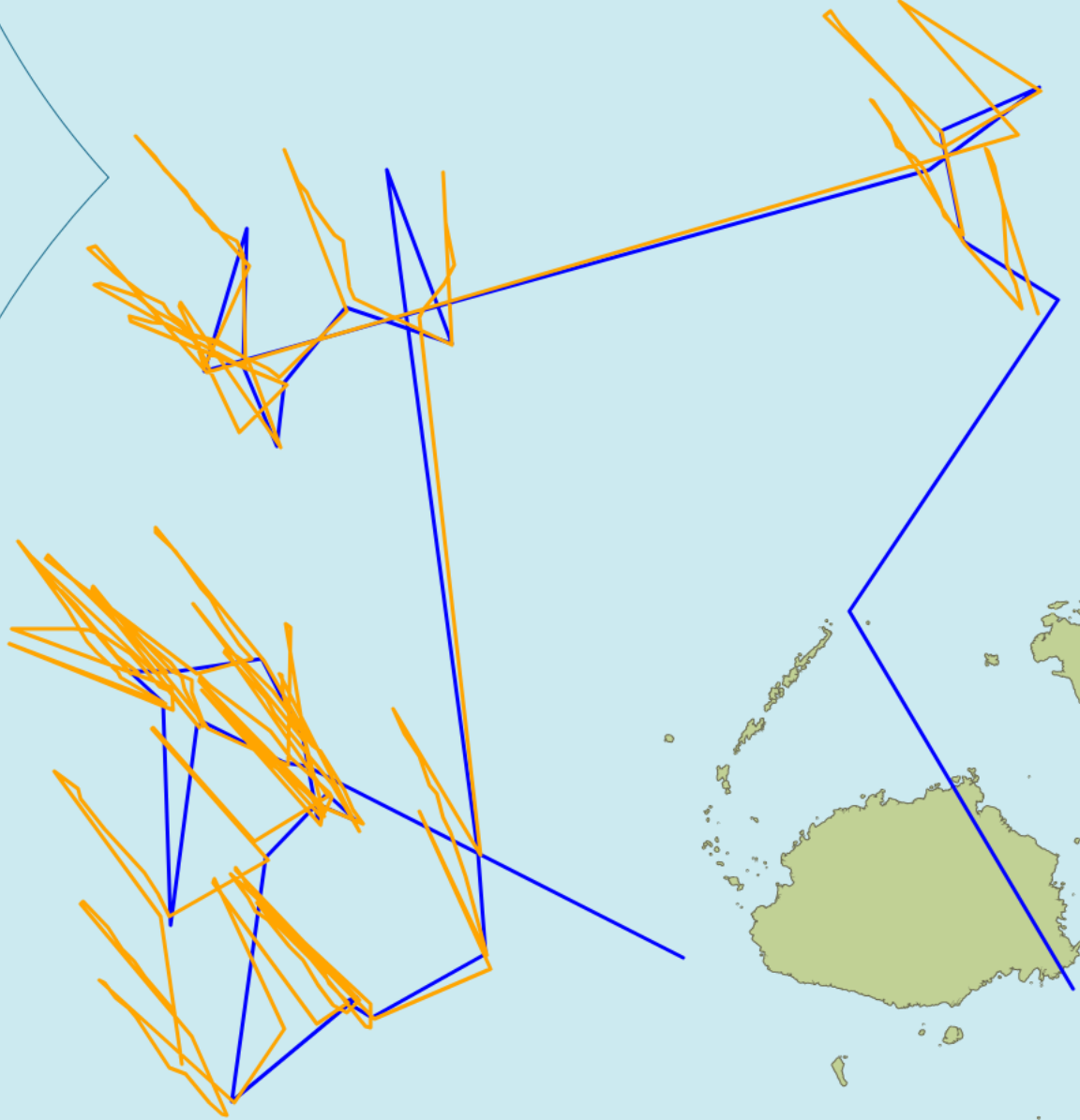
- Set log track
- Set logs
- Compliance events
- Logsheet track
- Observer track
- VMS track
- VMS points



lat: 1434.058S : lon: 17848.153E



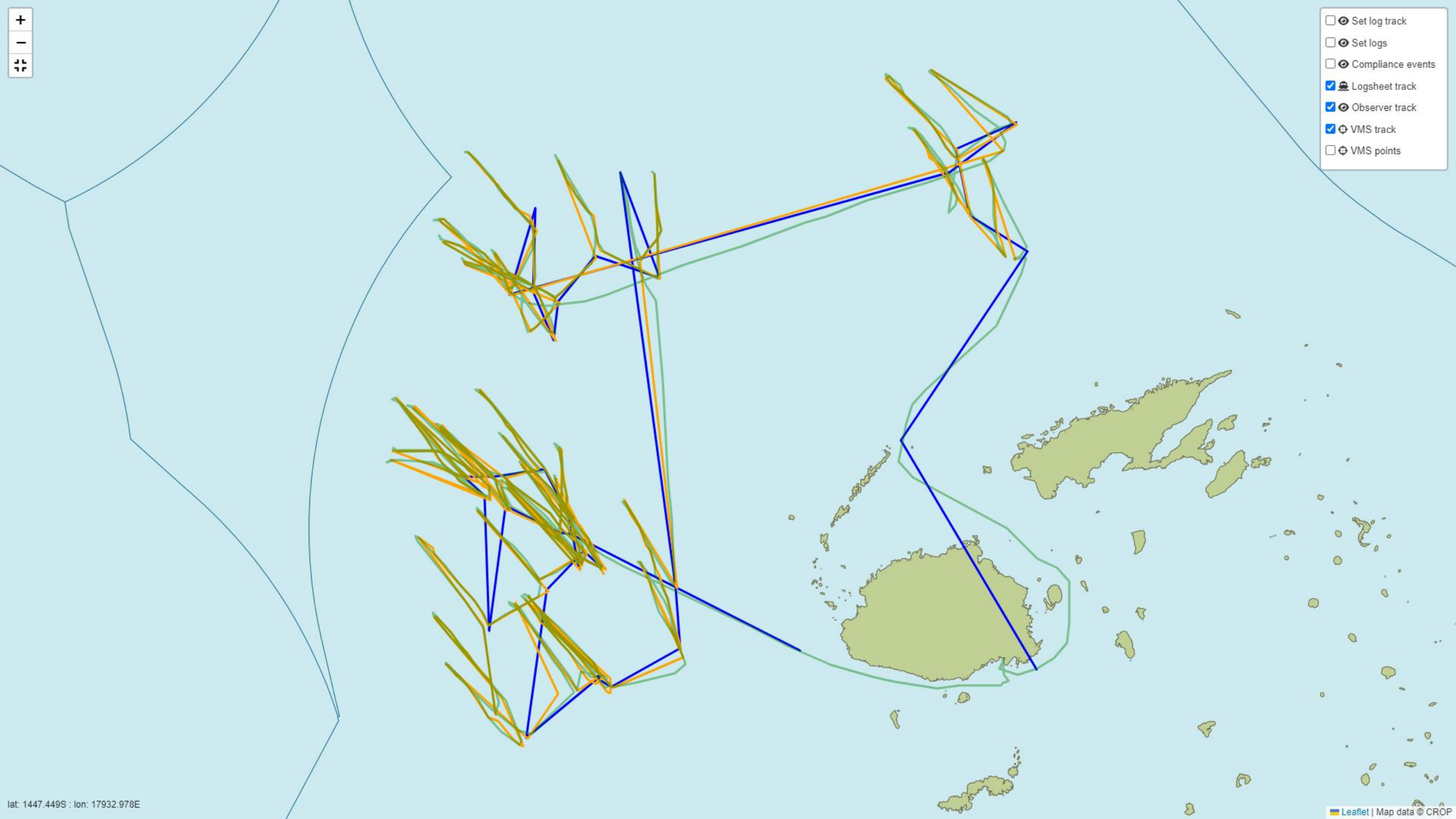
- Set log track
- Set logs
- Compliance events
- Logsheet track
- Observer track
- VMS track
- VMS points



lat: 1522.773S : lon: 17718.835E



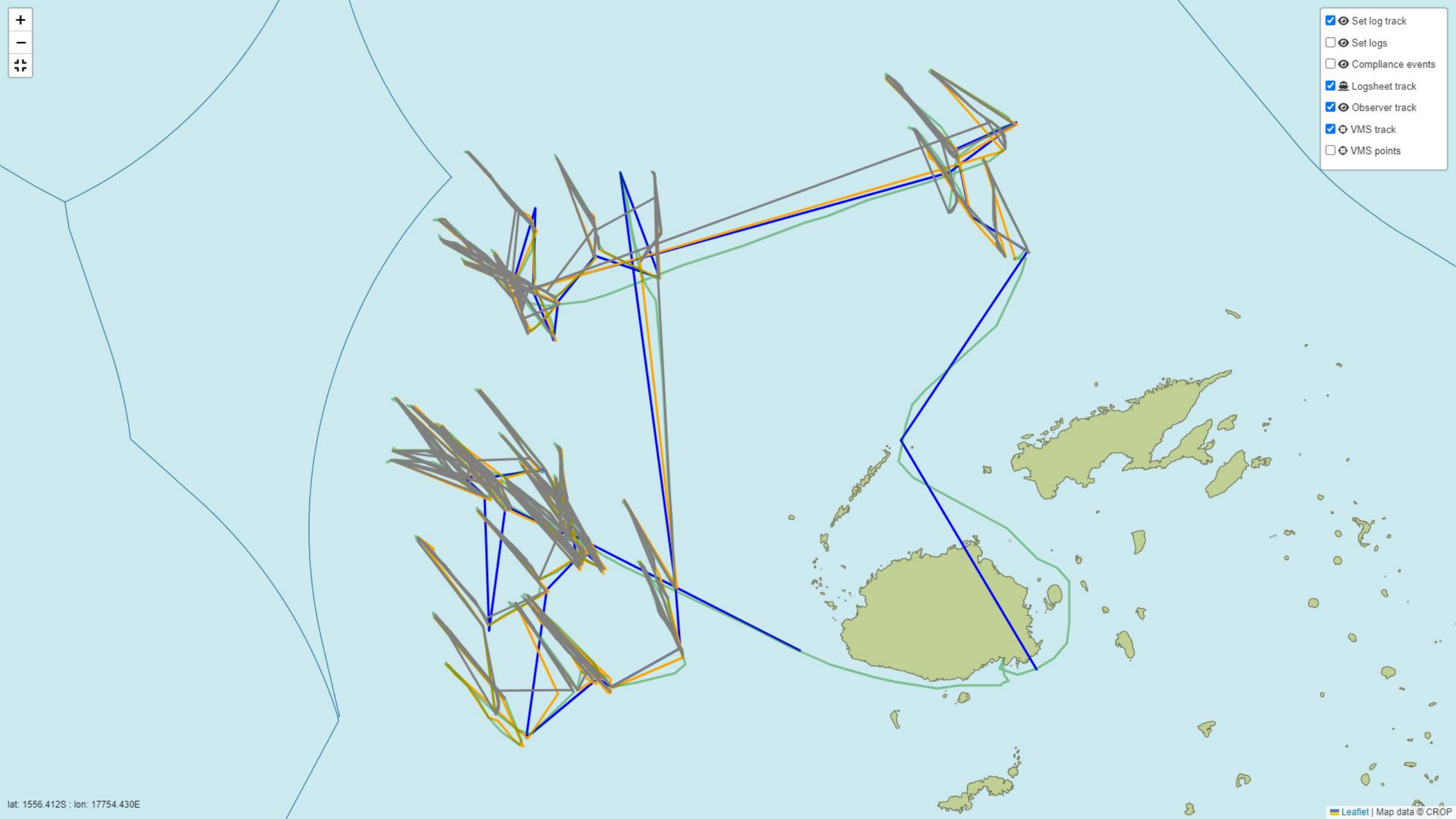
- Set log track
- Set logs
- Compliance events
- Logsheet track
- Observer track
- VMS track
- VMS points



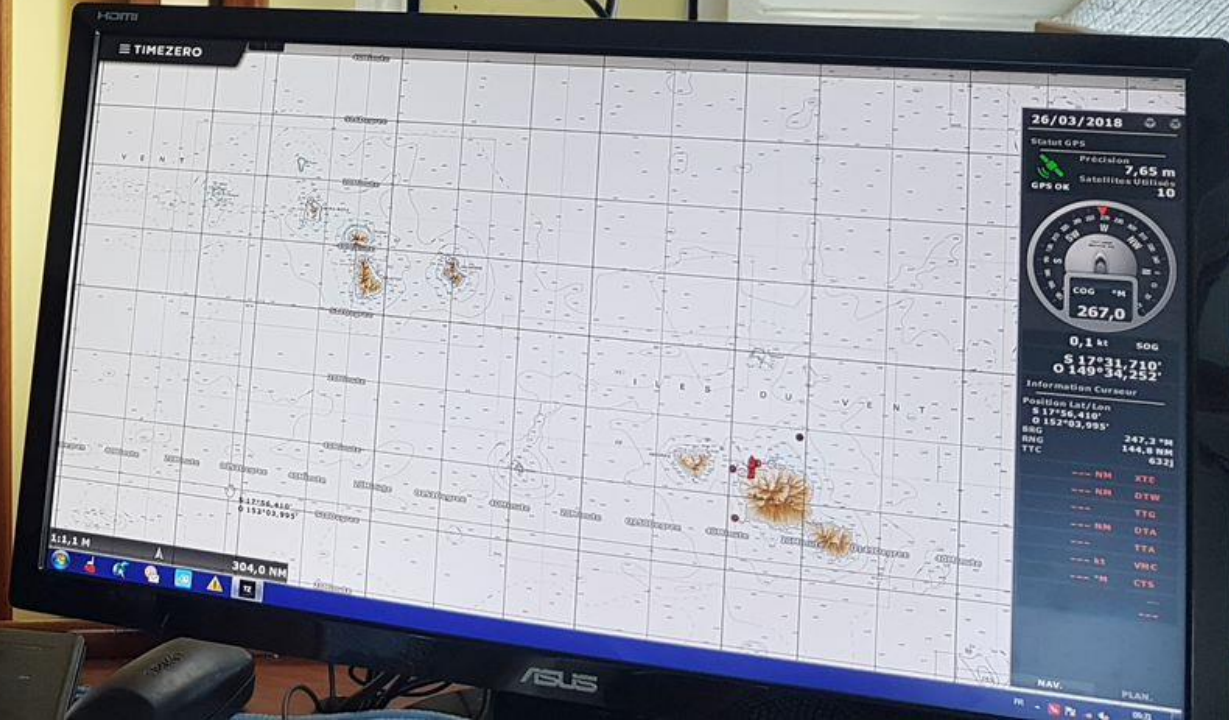
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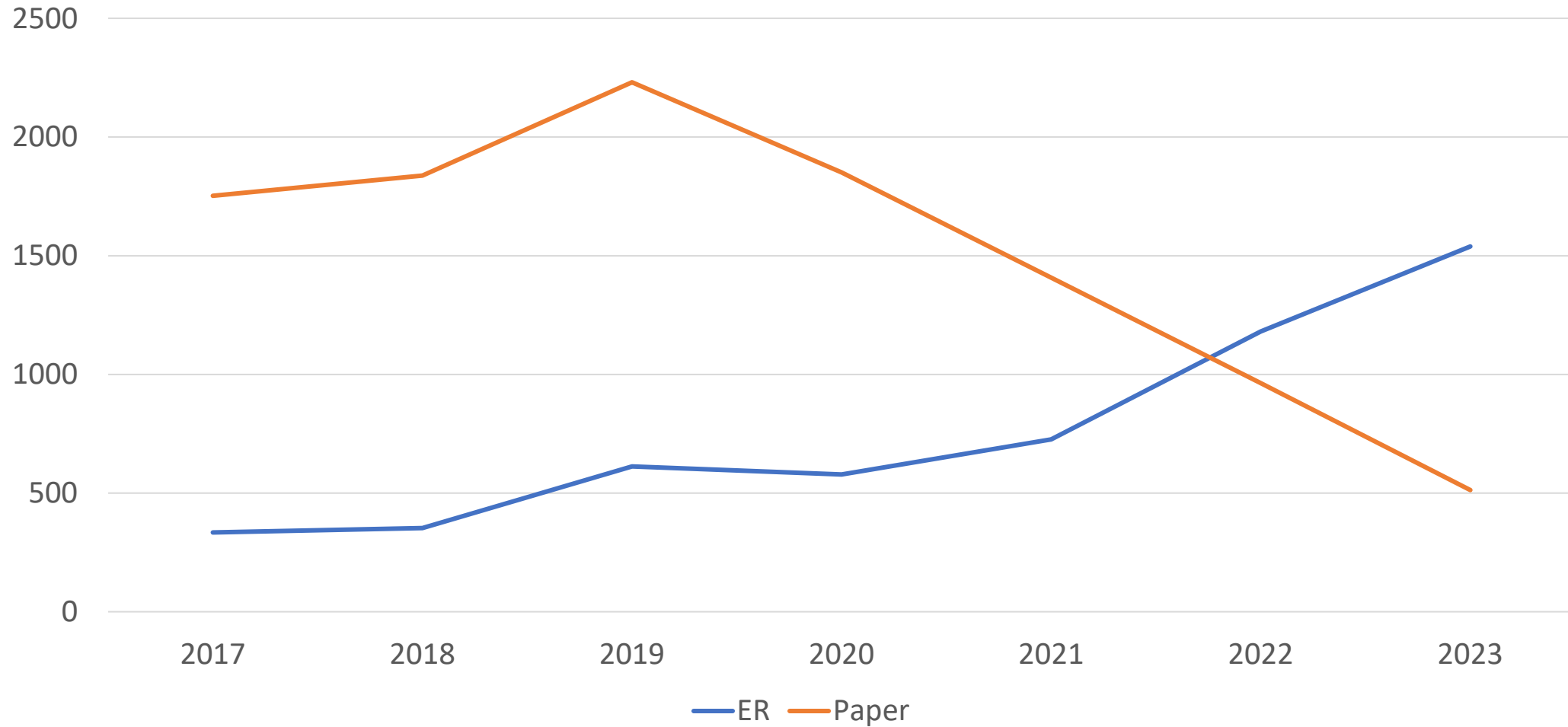
- Set log track
- Set logs
- Compliance events
- Logsheet track
- Observer track
- VMS track
- VMS points



lat: 1556.412S : lon: 17754.430E



## Purse seine logsheets submission to TUFMAN2

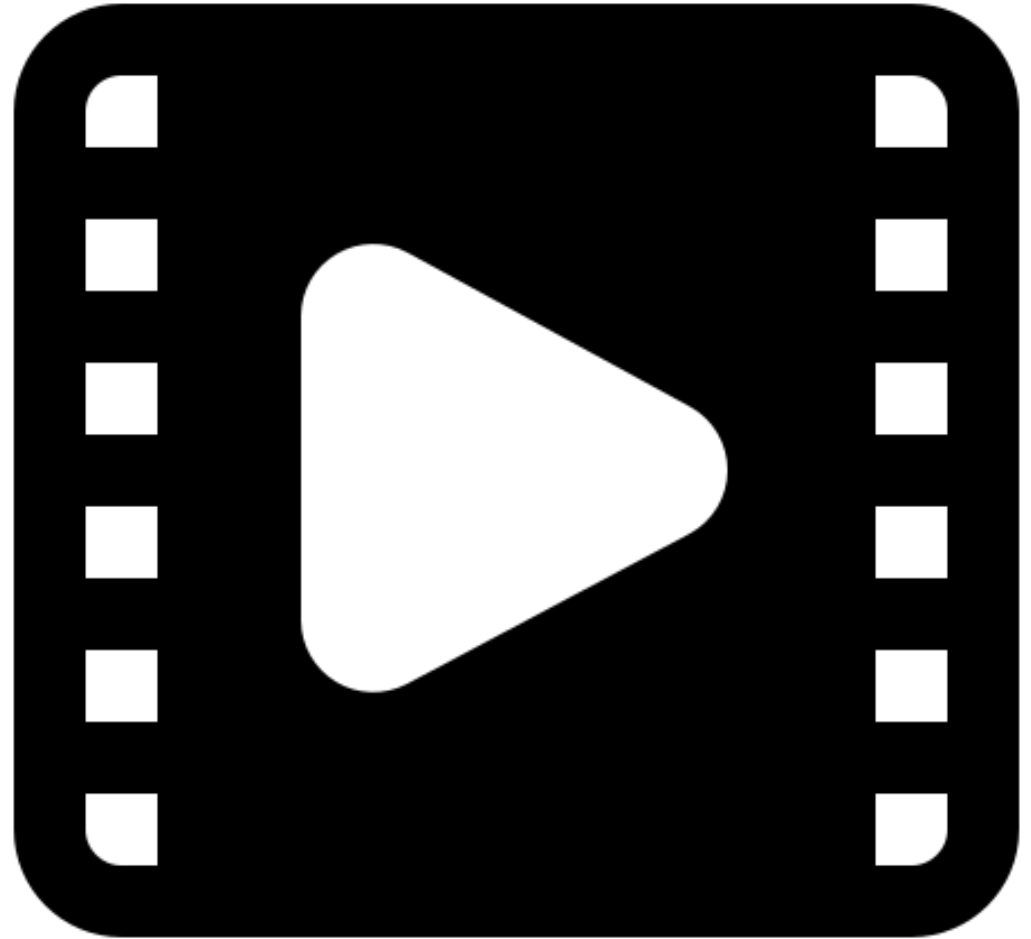


# E-Reporting replacing paper

- More resource to analyse and correct data
  - Increased data quality
  - Better reporting => better decisions
- Timely data
  - Allows for more traceability
  - Better reactivity for reporting



TUFMAN2





# What's next?



# Connected vessels

- ER/EM revolution
  - Daily submission or E-Reporting data
  - Live access to E-Monitoring
- Flatten data analysis
  - Access data before the vessel is back in port
  - Especially valuable for months-long trips
- Game changer for compliance and support

# AI powered analysis

- Improved data quality
  - Smart DQC using of historical data for each data submission
  - Smart track comparisons
- Massive data analysis
  - VMS / AIS / EM positions
  - FAD positions



What's next

